REPORT

OF THE

BOMBAY BACTERIOLOGICAL LABORATORY

FOR THE YEAR 1921

BY

Lieut.-Colonel Wm. GLEN LISTON, C.I.E., M.D., D.P.H., I.M.S.,

Director, Bombay Bacteriological Laboratory.

BOMBAY

PRINTED AT THE GOVERNMENT CENTRAL PRESS

1922

[*Price—2½ annas*]

[*Copies obtainable from the Superintendent, Government Printing and Stationery, Poona.*]

OFFICIAL AGENTS FOR THE SALE OF INDIAN OFFICIAL PUBLICATIONS.

IN ENGLAND.

CONSTABLE & Co., 10, Orange Street, Leicester Square, W. C., London.

GRINDLAY & Co., 54, Parliament Street, S. W., London.

HENRY S. KING & Co., 65, Cornhill, E. C., London.

P. S. KING & SON, 2 & 4, Great Smith Street, Westminster, S. W., London.

KEGAN PAUL, TRENCH, TRUBNER & Co., Ltd., 68-74, Carter Lane, E. C., and 39, New Oxford Street, London, W. C.

B. QUARITCH, 11, Grafton Street, New Bond Street, W., London.

W. THACKER & Co., 2, Creed Lane, London, E. C.

LUZAC & Co., 46, Great Russel Street, London, W. C.

B. H. BLACKWELL, 50 & 51, Broad Street, Oxford.

DEIGHTON BELL & Co., Limited, Cambridge.

T. FISHER UNWIN, Limited, 1, Adelphi Terrace, London, W. C.

ON THE CONTINENT.

ERNEST LEROUX, 28, Rue Bonaparte, Paris.

MARTINUS NIJHOFF, The Hague.

IN INDIA.

HIGGINBOTHAM & Co., Mad

V. KALYANARAMA IYER &

P. R. RAMA IYER & Co., M

THACKER, SPINK & Co., Ca

W. NEWMAN & Co., Calcutt

S. K. LAHIRI & Co., Calcutt

R. CAMBRAY & Co., Calcutt

BOMBAY BRANCH
OF THE
Royal Asiatic Society.

THACKER & Co., Limited, Bombay.

SUPERINTENDENT, GOVERNMENT PRINTING AND STATIONERY, Poona.

D. B. TARAPOREVALA SONS & Co., Bombay.

GOPAL NARAYAN & Co., Booksellers, etc., Bombay.

Mrs. RADHABAI ATMARAM SAGOON, Booksellers, etc., Bombay.

RAMCHANDRA GOVIND & SON, Booksellers, etc., Bombay.

BOMBAY TRACT AND BOOK SOCIETY, Bombay.

N. B. MATHUR, N. K. H. PRESS, Allahabad.

MANAGER, NYAYASHRAYA PRESS, Poona.

RAMA KRISHNA & SONS, Lahore.

SUNDAR PANDURANG (RAMNATH SUNDAR, the Successor), Bombay.

THE PROPRIETOR OF THE NEW KITABKHANA, Poona.

KARSANDAS NARANDAS & SONS, Surat.

N. M. TRIPATHI & Co., Booksellers, etc., Bombay.

MUNSHI SEETARAM, Managing Proprietors, Indian Army Book Depot, Tuhi, Cawnpor

MANGALDAS HARKISANDAS, Bookseller, etc., Surat.

KING & Co., Bombay.

MANAGER, SHRI SHANKAR KARNATAKA PUSTAKA BHANDARA.*

*For the sale of official Kanarese publication in the Belgaum, Dharwar, Bijapur and Kanara districts.

Digitized with financial assistance from the Government of Maharashtra on 11 July, 2017

CONTENTS.

	Page.
Staff	1
Arrangement of the Report	1

PART I.

Output, in doses, of anti-plague vaccine for the past five years ...	1
Distribution of anti-plague vaccine	2
Examination of rats for plague	2
Educational work in connection with plague	3

PART II.

Examination of Pathological fluids and discharges, water and food-stuffs, etc.	4
Classification of morbid tissues sent for examination	5
Diagnosis of rabies	6
The preparation of vaccines	6
Snakes	6
Research work	7
Assistance and advice rendered	8
Educational work	8

LIBRARY OF THE BOMBAY BRANCH OF THE ROYAL ASIATIC SOC

REPORT OF THE BOMBAY BACTERIOLOGICAL LABORATORY FOR THE YEAR 1921.

Staff.

Staff.

1. This report deals with the work carried out at the Laboratory during the year 1921. Major E. C. Hodgson, D.S.O., I.M.S., acted as Director from 1st January to 21st October 1921, while Lieutenant-Colonel W. Glen Liston, I.M.S., on return from leave was in charge till the end of the year.

The Director was assisted by the following officers :—

(1) Major J. A. Cruickshank, I.M.S., from 19th January 1921 to 16th July 1921.

(2) Major J. H. Horne, I.M.S., from 2nd June 1921 to 10th September 1921.

(3) Dr. D. A. Turkhud, M.B. C.M. (Edin.), from 1st January 1921 to 31st December 1921.

(4) Dr. S. N. Gore, L.M. & S., from 1st January 1921 to 10th May 1921 and from 10th November 1921 to 31st December 1921.

(5) Dr. M. B. Soparkar, M.D. (Bombay), from 1st January 1921 to 31st December 1921.

Arrangement of the Report.

Arrangement of the Report.

2. The report has been divided as usual into two parts dealing with the work done under separate heads—

(*i*) The Laboratory where all the anti-plague vaccine used in India and its dependencies is made, and where investigations connected with plague are carried out, and

(*ii*) The Bombay Bacteriological Laboratory where work connected with preventive medicine and pathological diagnosis for the whole of the Bombay Presidency is carried out.

PART I.

Work connected with Plague.

(*a*) Routine Work.

Manufacture and distribution of the Plague Prophylactic.

Output in doses of anti-plague vaccine for the past five years.

3. The table below gives comparative figures of output in doses of anti-plague vaccine for the past five years. In these figures the dose of the vaccine is reckoned as 4 c.c. but when used within three months of the date of manufacture a dose of only 3 c.c. is recommended :—

1917.	1918.	1919.	1920.	1921.
1,821,661.	1,543,099.	1,011,175.	1,468,729.	823,230.

From the opening of the Laboratory in 1896 up to the end of the year, 21,142,100 doses of the vaccine have been sent out.

Distribution of anti-plague vaccine.

The distribution of anti-plague vaccine in India and foreign countries during the last two years is shown below :—

(Figures represent the number of doses.)

Place or Province.	1920.	1921.
Bombay Presidency and Sind	106,017	39,874
Madras Presidency	213,700	141,846
Bengal, Bihar and Assam	4,635	24,160
United Provinces of Agra and Oudh	83,385	22,512
The Punjab	40,241	33,500
North West Frontier Provinces	14,258	3,084
Central Provinces and Berar	49,739	44,502
Burmah	109,160	51,126
Native States in India	237,527	93,158
Countries outside India	610,067	369,148
Portuguese Territory in India	.....	320
Total number of doses ...	1,468,729	823,230

The following table shows the number of doses of anti-plague vaccine despatched monthly during the past two years :—

Month.	1920.	1921.
January	95,280	169,582
February	132,940	102,350
March	45,325	68,482
April	44,035	18,816
May	80,440	57,632
June	33,365	27,770
July	90,000	38,816
August	118,245	107,364
September	107,990	77,856
October	240,337	63,728
November	361,054	56,358
December	119,718	34,476
Total ...	1,468,729	823,230

(*b*) Research.

4. No important research in connection with plague was undertaken during the year but observations on the habits of rats especially in connection with the shipping in the Port of Bombay were carried out by Dr. G. D. Chitre. A separate report on these observations has been submitted through the Director of Public Health, Bombay, under this office No. P.-5210, dated 20th/21st October 1921.

(*c*) Assistance and Advice Rendered.

5. The Health Department of the City of Bombay continued to send to this Laboratory rats found dead or caught alive within the Municipal limits. With each rat a note was received indicating where it had been caught or found, so that after examination it was possible to inform the Health Officer where plague infected specimens had been caught or picked up. The Health Officer was thus able to know definitely from day to day the progress of the disease among rats in the different parts of the City.

Examination of rats for plague.

During the year 1921, 698,647 rats were received at the Laboratory. Of this number 215,511 were alive when received, and 483,136 were dead. Of the latter 347,386 were examined and among them 11,721 were found to be plague-infected.

The following table shows the progress of plague among men and rats in Bombay City during each half month of the year 1921. The figures which refer to human mortality record the number of deaths from plague each half month. The figures showing the progress of the disease in rats are given separately for Mus rattus and Mus decumanus. These figures have been calculated from the number of rats found infected at the examination made at the laboratory on every day of the week except Sundays and Holidays; from the actual figures thus obtained a figure has been calculated for all the days of each half month and these are the figures recorded below:—

Return of rats examined during the year 1921.

	Human plague mortality.		Plague-infected Mus rattus.		Plague-infected Mus decumanus.	
	Number of deaths from plague.	Percentage above or below mean for the year.	Figures calculated from each half month.	Percentage above or below mean for the year.	Figures calculated for each half month.	Percentage above or below mean for the year.
1st to 15th January 1921	0	−100	13·7	−82	237·5	−56
16th to 31st „ „	4	−86	38·2	−49	370·5	−31
1st to 15th February „	7	−75	48·5	−35	501·9	−7
16th to 28th „ „	16	−43	50·7	−32	648·7	+20
1st to 15th March „	26	−7	132·5	+78	1166·2	+116
16th to 31st „ „	83	+196	244·4	+229	2388·4	+342
1st to 15th April „	139	+396	366·9	+394	2656·2	+391
16th to 30th „ „	162	+479	226·2	+204	1666·2	+208
1st to 15th May „	98	+250	145·0	+95	875·0	+62
16th to 31st „ „	56	+100	92·3	+24	697·8	+29
1st to 15th June „	14	−50	47·7	−36	276·8	−49
16th to 30th „ „	13	−54	27·5	−63	168·7	−69
1st to 15th July „	8	−71	27·7	−63	141·9	−74
16th to 31st „ „	3	−89	24·6	−67	97·2	−82
1st to 15th August „	9	−68	19·6	−74	81·9	−85
16th to 31st „ „	7	−75	28·0	−62	102·7	−81
1st to 15th September „	9	−68	20·0	−73	85·0	−84
16th to 30th „ „	10	−64	35·8	−52	122·3	−77
1st to 15th October „	1	−96	30·0	−60	108·7	−80
16th to 31st „ „	4	−86	41·8	−44	110·8	−80
1st to 15th November „	2	−93	38·2	−49	94·1	−83
16th to 30th „ „	0	−100	25·9	−65	95·5	−82
1st to 15th December „	2	−93	23·1	−69	108·5	−80
16th to 31st „ „	4	−86	35·7	−52	173·5	−68
Total ...	677	...	...	...	...	...

(*d*) Educational Work.

6. (1) During the year five medical men and one medical lady underwent a course of practical training in Bacteriology at the Laboratory.

(2) Three Sub-Assistant Surgeons from the Central Provinces attended the Laboratory under the orders of the I. G. of Civil Hospitals, C. P., Nagpur, and were trained in Bacteriology and Pathology.

(3) Professor Baluch of the Poona Agricultural College spent some time in the laboratory studying Bacteriological technique as applied to the examination of milk.

(4) A Laboratory Assistant sent by the Assistant Director of Public Health, IV Range, U. P., Lucknow, was instructed in the preparation of bacteriological media, the use of simple stains, the preparation of pathological specimens and laboratory technique generally.

(5) Four medical men were taught the technique of inoculation.

PART II.

Work of the Laboratory as the Provincial Bacteriological Laboratory.

(*a*) Routine Work.

I.—Examination of pathological fluids and discharges, water, foodstuffs, etc.

Examination of Pathological fluids and discharges, water and foodstuffs.	7. (1) Blood sera for agglutination for typhoid, paratyphoid and Malta fevers, etc. ...	150	Specimens.
	(2) Blood for Wassermann reaction	994	,,
	(3) Blood smears examined ... 182 Blood counts made ... 7 = ...	189	,,
	(4) Sputa for B. tuberculosis or other organisms ...	65	,,
	(5) Throat swabs for diphtheria, meningococci, pneumococci, etc.	17	,,
	(6) Urine and fæces—		
	Urine for general examination, tuberculosis, cholera, bilharziosis, etc.	79	,,
	Fæces for cholera, dysentery, typhoid, etc. ...	105	,,
	(7) Smears of pus for gonococci, meningococci, etc. ...	22	,,
	(8) Fluids and discharges	33	,,
	(9) Cultures of organisms for identification	40	,,
	(10) Smears from rats for the presence of bacillus pestis ...	26	,,
	(11) Specimens examined for the presence of leprosy bacilli	2	,,
	(12) Milk samples of dairy milk	22	,,
	(13) Water—		
	Chemical examination ... 139 Bacteriological examination ... 40 = ..	179	,,
	(14) Food-stuffs examined or analysed	10	,,
	(15) Miscellaneous examinations of chloroform, tallow, sodium, air and earth	5	,,
	(16) Brushes examined for anthrax	21	,,
	(17) Articles tested for sterility	32	,,
	(18) Disinfectants tested	4	,,
	(19) Post-mortem examinations carried out on animals received from the Victoria Gardens	21	,,
	(20) Mosquitoes, worms, snakes, for identification ...	3	,,

II.—Pathological tissues for diagnosis.

Classification of morbid tissues sent for examination.

8. I.—Tumours.—

A.—Non-malignant.

Fibroma	2
Fibro-adenoma	5
Fibro-chondroma	1
Cystic-fibro-adenoma	3
Papillary Cyst Adenoma	1
Glioma	1
Keloid	1
Fibrous epulis	2
Lymphangioma	1
Fibro-Myoma (uterus)	4
Papilloma	4
Dermoid	1
	26

B.—Malignant.

Carcinoma	16
Squamous Carcinoma	14
Adeno-Carcinoma	5
Melano-Carcinoma	2
Secondary Carcinoma	1
Round cell sarcoma	6
Spindle cell Sarcoma	4
Myeoloid Sarcoma	1
Melanoma	3
Fibro-Sarcoma	2
Fibro chondro sarcoma	1
	55

II. Granulomata.—

Tubercular granuloma	11
Syphilitic Granuloma	2
Mycetoma	1
Other granulomata	4
	18

III. Other pathological conditions.—

Chronic inflammatory condition	1
Acute yellow atrophy	5
Cytic goitre	1
Suppurative Hepatitis	1
Plague	4
Pneumonia	3
Perisplenitis	1
Tissues found to be normal	9
Miscellaneous pathological condition	95
	120
Total ...	219

III.—Diagnosis of Rabies.

Examinatian of dogs, etc., for rabies.

9. The following is the statement of the examination of brains of dogs and other animals for the diagnosis of rabies during the year 1921 :—

Bombay :—

Through the Bombay Veterinary College	28
Through the Bombay Police	14
Through private owners	8
From other places in Bombay	4
From outstations	48
	102

The result of the examination of these animals was as follows :—

Received in a condition unfit for examination	8
No evidence of rabies	22
Negri bodies found, brains obtained from rabid animals ...	72
	102

IV.—The preparation of vaccines.

Vaccines.

10. In addition to the plague vaccine details of which are recorded elsewhere the following vaccines were prepared at the laboratory and supplied both to military and other bodies in and out of India.

Autogenous vaccines prepared for 293 cases.

Stock Vaccines :—

Staphylococcus	60	c.cs.
Streptococcus	23	„
Gonococcus	...	„
B. Acne	12	„
Tuberculin	50	„
Pneumococcus	40	„
Anti-cholera	31,500	„
Mixed T. A. B.	4,830	„
Leprosy	2,470	„
Influenza	3,680	„

V.—Snakes.

11. The following poisonous snakes were received alive at the Laboratory :—

Place.	Cobras.	Russell's vipers.	Krait.	Echis.
Narsingpur	6	...	...	...
Bombay	7	9	...	...
Total ...	13	9	...	...

Total number of snakes received alive 22

Snakes.

Venom was collected periodically from the cobras and Russell's Vipers. It was dried and sent to the Central Research Institute, Kasauli, where the anti-venine is prepared.

(*b*) Research Work.

12. (1) Among the biochemical reactions of lactose-fermenting organisms of the "Typhoid-colon" group, Indole and Voges-Proskauer reactions stand pre-eminent. It is therefore essential that the techniques of such routine reactions should be simple, rapid and reliable. Such a technique has already been described for Indole, *viz.*, the "Cotton-Wool-Plug" test, in last year's report, but as none of the methods so far recommended for performing the Voges-Proskauer reaction fulfilled the conditions of a routine test, Dr. S. N. Gore at the suggestion of the Director conducted an investigation into the procedures recommended for perfoming the Voges-Proskauer reaction. As a result of this a technique which conforms to the requirements of a routine test has been developed. The procedure is as follows :—The culture is inoculated in nutrient broth containing one per cent. of glucose ; at the end of every twenty-four hours' period of incubation a loopful of the culture is removed on a white procelain slab and mixed with a loopful of a forty per cent. solution of caustic soda. In the case of a positive Voges-Proskauer reaction a distinct pink colour develops in about five minutes and if no pink appears in ten minutes, the result is taken as negative. In a large majority of positive cultures it was found that twenty-four hours' incubation suffices, and it was only in a few cases that further incubation was required. In the glucose broth, the pink colour of the V. P. reaction attained its maximum in about ten to fifteen minutes and faded away almost completely in about one hour. We have shown that if milk be used instead of broth for the glucose medium, not only a brighter pink colouration was obtained but the mixture of the culture and soda solution solidified on the slab and formed a dry pink spot which retained the intensity of the colour for more than six hours. In certain instances we have observed that when saccharose was used in place of glucose in the culture media, a positive V. P. reaction appeared after a shorter period of incubation, and the pink colour was brighter than in glucose media. A paper on the subject was read at the Medical Section of the 1921 Session of the Indian Science Congress held at Madras.

Schistosomiasis.

(2) Investigations in connection with Schistosomiasis were continued by Dr. Soparkar. He was deputed to Secunderabad to make investigations in connection with a supposed indigenous case of vesical Bilharziosis, that occurred in a British soldier in the Station Hospital, Secunderabad. History of the case pointed to two tanks in the vicinity of Bolarum in which the patient was in the habit of bathing some months previously as a probable source of infection. Examination of the locality did not lead to the discovery of any snails that could be regarded as carriers of Sch. hematobium nor were any human Schistosome cercariæ found in any of the tanks. A species of furcocercous cercaria was, however, found in one of the village tanks. This on further examination and animal experiment proved to be that of Sch. spindalis. A large number of animals were examined at the Slaughter house in Secunderabad for the presence of Bilharziosis. One sheep was found infected and the worm on examination was found to be identical with Sch. spindalis. This appears to be the first case to be put on record where this species of schistosome has been found in a sheep.

Medium for growing B. influenzæ.

(3) Dr. Soparkar did some experiments to test the effect of different degrees of temperature applied to the mixture of blood on the nutritive quality of the resulting extract used in the preparation of the medium devised by him for the cultivation of the influenza bacillus. It was found that the best results were obtained when the blood was heated at from 66°—68° C. and that with increasing temperature, *e.g.*, of 75°C. 85° C. and 100°C. the resulting growth became less and less luxurient until practically very little growth was obtained when the blood was autoclaved at 120°C. On the other hand the medium prepared with blood that was heated to only 56°C. also gave a comparatively poor growth of B. influenza. These experiments indicate that the optimum temperature at which the blood mixture should be heated lies somewhere between 56° and 75°C. The experiments are being continued.

Digitized with financial assistance from the Government of Maharashtra on 11 July, 2017

(*c*) ASSISTANCE AND ADVICE RENDERED.

13. Sub-Assistant Surgeon T. G. Akula was deputed to Belapur on behalf of the Belapur Company, Ltd., to investigate the cause of fever prevalent there, in the month of October 1921. A separate report has been submitted to Government under this office No. 5234, dated the 21st October 1921. The mosquito which acted as a carrier in this instance was A. Stephensi. The mosquito was breeding in certain collections of water mainly derived from leakage from the irrigation canals.

(*d*) EDUCATIONAL.

14. Special demonstrations were arranged for the students of Training College, Dhulia, Elphinstone College, Bombay, Agricultural College, Poona, Ratnagiri High School and Telang High School, Godhra.

A series of lectures on "Diseases" were given this year to the teachers under training in the Secondary Training College, Bombay.

Facilities were given to Dr. Victor G. Heiser, Director for the East of the International Health Board to see the work of the Laboratory, during his visit to Bombay.

A number of sets of magic lantern slides on plague, tuberculosis, guinea-worm, malaria, milk and snakes were prepared at the Laboratory and issued to the Savantvadi and Kolhapur States, to the Sanitary Associations, Bijapur and Dharwar, and the Dy. Educational Inspector for Visual Instruction, Bombay. Also some photo prints from our negatives have been supplied to the Health Officer, Station Municipality, Bangalore, for public Health Exhibition.

A set of slides on snakes was given on loan to the Director, King Institute of Preventive Medicine, Guindy, Madras. Slides on different subjects were also issued on loan to Major Stott, I.M.S., Headquarters, U. P. District.

During the year Dr. Chitre conducted in this Laboratory the course of Instructions in the subject of Rat Destruction to the Sanitary and Conservancy Inspectors of the Bombay Municipality.

WM. GLEN LISTON,
M.D., D.P.H., Lt.-Col., I.M.S.,
Director, Bombay Bacteriological Laboratory.

Bombay Bacteriological Laboratory,
Parel, Bombay, 2nd May 1922.

BOMBAY: PRINTED AT THE GOVERNMENT CENTRAL PRESS.